FOREST HEALTH PROTECTION

PACIFIC SOUTHWEST REGION

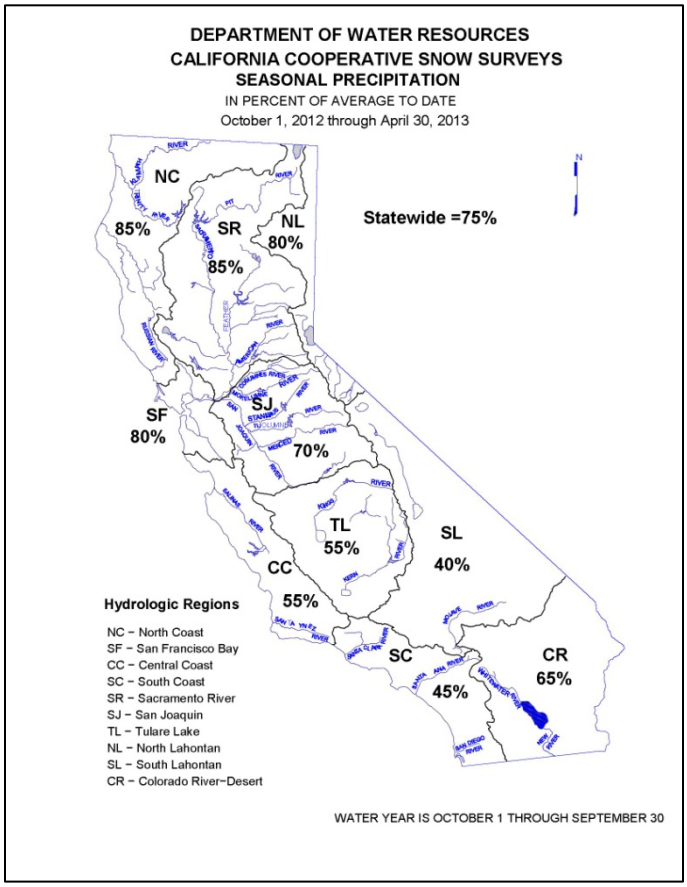
NORTHERN CALIFORNIA SHARED SERVICE AREA

BARK BEETLES, BELOW NORMAL PRECIPITATION, AND TREE MORTALITY – 2013

Much of the snowpack this year was carryover from the big early season storm events of late November and December. Dry, warm weather January through March started early melting with nearly one third of snowpack gone by April 1, the usual date of maximum accumulation. Hopes for late season improvement were dashed when April precipitation was only half of normal. The combined total January through May precipitation is the driest in 90 years of record. May 1 snowpack was the third driest in 60 years.

SUMMARY OF WATER CONDITIONS IN PERCENT OF AVERAGE

HYDROLOGIC REGION	PRECIPITATION OCTOBER 1 TO DATE	APRIL 1 SNOW WATER CONTENT	APRIL 1 RESERVOIR STORAGE	RUNOFF OCTOBER 1 TO DATE	APR-JULY RUNOFF FORECAST	WATER YEAR RUNOFF FORECAST
NORTH COAST	85	45	105	70	45	60
SACRAMENTO RIVER	90	40	105	75	55	70
STATEWIDE	**75**	**40**	**100**	**70**	**50**	**60**



Conifer mortality in northern California is highly correlated with available soil moisture during the growing season. A useful measure of available soil moisture is the percent of normal water content of the snowpack on April 1. The boundaries of National Forests often follow some of the topographic features of major watersheds used in state snow surveys. For example, the boundaries of the Shasta-Trinity NF correspond closely enough with the upper Sacramento River drainage to provide some crude, but useful predictions of mortality.

What we have learned from previous droughts is that conifer mortality will increase when the annual precipitation drops below 80% of average. Generally, two consecutive years of such deficit precipitation are needed before observing a dramatic rise in bark beetle-caused tree mortality.

Above normal precipitation in 2010-2011 (142%) improved tree defenses in many areas, but high beetle populations continued to cause mortality in some areas. High mortality

during non-drought years is often linked to high forest stand densities and chronic diseases in Northern California. Below normal precipitation started in 2011-2012 (55%) with most of the precipitation occurring in March as rain and heavy, wet snow causing damage to many stands. Water year 2012-2013 has continued the drought period with snow water content at April 1 at 15% of normal. Hydrologic conditions on June 1 showed cumulative precipitation at 85% of average and snow pack 9% of average with below average rainfall expected through July.

Areas with elevated levels of tree mortality were scattered throughout the four National Forests in 2012. Bark beetle-caused mortality was commonly linked to high stand densities and root disease.

- Klamath NF – 40,893 acres of mortality
- Mendocino NF – 17,417 acres of mortality
- Shasta-Trinity NF – 63,430 acres of mortality
- Six Rivers NF – 5,895 acres of mortality

Low levels of precipitation received in water year 2012/2013 are expected to stress trees and subsequently lead to increased levels of mortality in areas already experiencing mortality.

- Mountain pine beetle populations remained high in whitebark pine on the north face of Mt. Shasta in conjunction with high levels of dwarf mistletoe which increase water stress on host trees.
- The high levels of western pine beetle-caused mortality on the McCloud Flats of the Shasta-Trinity NF are in conjunction with black stain root disease.
- Fir engraver beetle-caused mortality is often found in association with dense stands and Heterobasidion root disease in white fir. These areas of mortality increase in size as the root disease spreads to surrounding trees.

Widespread tree mortality is expected to increase throughout the Service Area during the summer of 2013. Beetle populations will most likely respond quickly to increased stress due to limited water and high stand densities. Tree mortality will most likely be observed first in dense forest stands, in stands impacted by root diseases, or in areas where higher levels of bark beetle activity were observed in 2012.

Recommendation: Continue to promote and implement thinning treatments to meet integrated resource objectives, including reducing and maintaining tree density levels below those which increase susceptibility to successful bark beetle attacks.

REFERENCES

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CA Dept. of Water Resources. 2013. Hydrologic Conditions in California (06/01/2013). http://cdec.water.ca.gov/cgi-progs/reports/EXECSUM (accessed 11.06.13).

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